

Gulf Cooperation Council

👉 EDICT OF GOVERNMENT 👈

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GSO 37 (2012) (English): MOTOR VEHICLES METHODS OF TEST FOR IMPACT STRENGTH PART 2: MOVING BARRIER REAR IMPACT (Draft Standard)



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هيئة التقييس لدول مجلس التعاون دول الخليج العربية
STANDARDIZATION ORGANIZATION FOR G.C.C (GSO)



GSO 37/200...
Revised

السيارات – طرق اختبار تحمل الصدمات
الجزء الثاني: الصدمة الخلفية بالصادم المتحرك

MOTOR VEHICLES
METHODS OF TEST FOR IMPACT STRENGTH
PART 2: MOVING BARRIER REAR IMPACT

ICS:43.020

MOTOR VEHICLES

METHODS OF TEST FOR IMPACT STRENGTH

PART 2: MOVING BARRIER REAR IMPACT

Date of GSO Board of Directors Approval :
Issuing status : **Technical Regulation**

Foreword

Standardization Organization for GCC (GSO) is a regional Organization which consists of the National Standards Bodies of GCC member States. One of GSO main functions is to issue Gulf Standards /Technical regulation through specialized technical committees (TCs).

GSO through the technical program of committee TC No.2" Technical Committee of Mechanical standards " has updated the GSO Standard No. GSO 37/1994 " Motor Vehicles Methods Of Test for Impact Strength Part 2: Moving Barrier Rear Impact " . The Draft Standard has been prepared by Kingdom of Saudi Arabia

This standard has been approved as Gulf Technical Regulation by GSO Board of Directors in its meeting No. 4 held on 25/10/1426 (27/11/2005) The approved standard will replace and supersede the standard No. (GSO 37/200...).

**MOTOR VEHICLES
METHODS OF TEST FOR IMPACT STRENGTH
PART 2: MOVING BARRIER REAR IMPACT**

1- SCOPE AND FIELD OF APPLICATION

This standard is concerned with the method of test for the rear impact strength of passenger cars multi-purpose passenger vehicles, trucks and buses with GVW less than 4500 kg using the moving barrier.

2- COMPLEMENTARY REFERENCES

- 2.1 GSO 36/2005 “Motor Vehicles - Methods of Test for Impact Strength - Part 1: Frontal Impact”.
- 2.2 GSO 38/2005 “Motor Vehicles - Methods of Test for Impact Strength - Part 3A: Side Impact”.
- 2.3 GSO 1707/2005 “Motor Vehicles - Methods of Test for Impact Strength - Part 3B: Moving Barrier Side Impact”.
- 2.4 GSO 1708/2005 “Motor Vehicles - Methods of Test for Impact Strength - Part 3C: Moving Barrier Side Impact”.
- 2.5 GSO 39/2005 “Motor Vehicles - Methods of Test for Impact Strength - Part 4: Roof Strength”.
- 2.6 GSO 40/200... (Revised) “Motor Vehicles - Impact Strength”.

3- MEASURING INSTRUMENTS

- 3.1 Speed measuring device: It shall permit measurement of speed to an accuracy of $(\pm 1)\%$ of its reading.
- 3.2 Time measuring instrument: It shall permit measurement of time to an accuracy of (± 0.001) second.
- 3.3 Cinematographic camera: Its speed shall be from 200 to 1000 images per second.
- 3.4 Dimensions measuring instrument: It shall permit measurement of length to an accuracy of $(\pm 5)\%$ of its reading.

4- TEST CONDITIONS (A)

The following shall be met: Fuel Spillage Measurement for passenger cars, multipurpose passenger vehicles, trucks and buses having a GVW less than 4500 kg. The requirements of items 4 and 5 do not apply to vehicles meeting the requirements of items 6 and 7 or 8 and 9.

- 4.1 Test site
 - 4.1.1 The test site shall be of sufficient area to provide for accommodation of the instruments, and for the attaining of the desired velocity by the moving barrier.
 - 4.1.2 It shall have a horizontal section of hard standing, straight and at least 15 m long, which shall not slope from the horizontal by more than 3° over any one meter length of the path of the moving barrier.
 - 4.1.3 Provision shall be made so that the test car remains on the hard surface of track during the total time of test.
 - 4.1.4 It shall be equipped with means to move the impact barrier at the specified velocity, without deviation from its path, until impact.
- 4.2 Moving impact barrier (Fig. 1)
 - 4.2.1 Its total weight shall not exceed (1814 ± 23) kg, distributed by its front and rear axles so that their loadings are:
 Front: $(60 \pm 10)\%$ of its load
 Rear : $(40 \pm 10)\%$ of its load
 - 4.2.2 It shall be of rigid construction, and symmetrical about a longitudinal vertical plane, it shall be fitted with wheels of fixed non-steerable front and rear axles, attached directly to the frame rail, without springs or other type of suspension system absorbing impacts or shocks.
 - 4.2.3 The impact barrier shall be provided with braking system to prevent it from making any other impact with the test vehicle after carrying out the initial impact.
 - 4.2.4 The height of the impact front surface of the barrier shall be 1524 mm and its width shall be 1981 mm; the ground clearance to the lower edge of the impact surface shall be 127 mm; the impact surface shall be covered with plywood (20 ± 2) mm thick.
 - 4.2.5

Height of centre of gravity	: (400 ± 40) mm
Track	: (1500 ± 30) mm
Wheelbase	: (3050 ± 60) mm

 The pneumatic tyres shall be inflated to (197 ± 30) KPa.
 - 4.2.6 The edges of the surfaces shall be rounded with a radius of curvature of (45 ± 10) mm.
- 4.3 Test vehicle
 - 4.3.1 The vehicle shall be loaded with the weights corresponding to the kerb load, each standing in its located place.

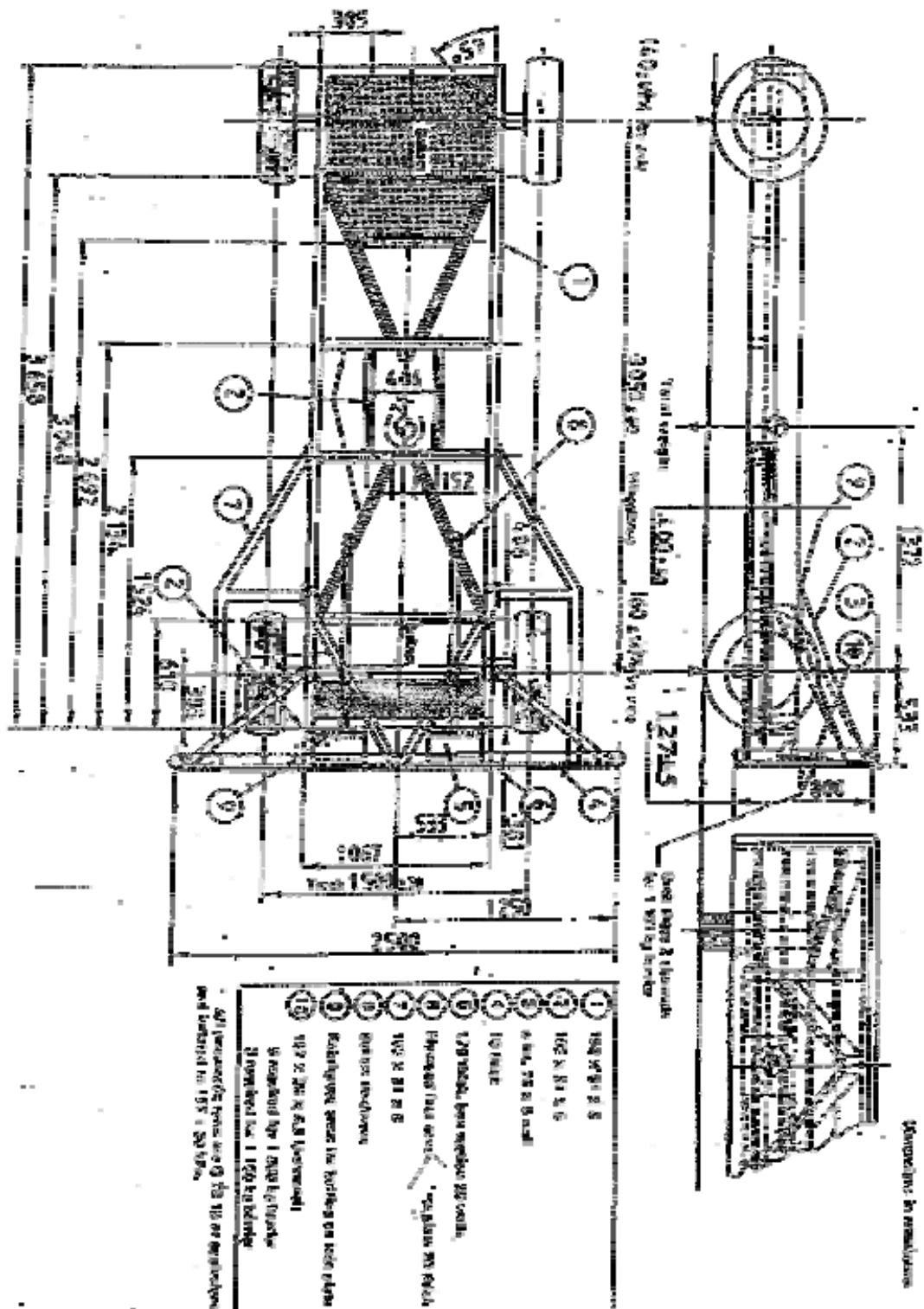


Fig. 1 Moving Barrier Rear Impact

- 4.3.2 The fuel tank shall be filled to at least 90% of its capacity with a liquid having a density of a fuel normally used.
- 4.3.3 The transmission arm shall be in neutral position.

5- TEST PROCEDURE (A)

- 5.1 The barrier shall be moved to impact the vehicle and the following shall be met:
 - 5.1.1 The longitudinal plane of the vehicle shall be perpendicular to the impact surface of the moving barrier within $(\pm 2)^\circ$.
 - 5.1.2 The lateral misalignment between the median longitudinal vertical plane of the test vehicle and the median longitudinal vertical plane of the impact surface of the moving barrier, shall not exceed 150 mm.
 - 5.1.3 The speed of the barrier at the moment of impact with the vehicle, shall be 48 km/h.
 - 5.1.4 At the moment of impact, the moving barrier shall be disconnected from any external propulsion, and/or guidance system.
 - 5.1.5 The attachment of the moving barrier to any external propulsion or guidance system, shall not affect the characteristics of the moving barrier.
- 5.2 The liquid spillage from the fuel tank and fuel system, from the moment of impact to cessation of movement of the barrier and the vehicle, and during the five minutes period following their cessation, shall be measured. Also for the subsequent period of 25 minutes the fuel spillage shall be measured.

6- TEST CONDITIONS (B)

- The following shall be met (Displacement of the Vertical Projection of the rear seat R-point): for passenger cars and multi-purpose passenger vehicles, and (at the manufacturer's choice) to trucks and buses. The requirements of items 6 and 7 do not apply to vehicles which meet the requirements of items 4 and 5 or 8 and 9 having a GVW less than 4500 kg.
- 6.1 Test Site
 - 6.1.1 The test area shall be large enough to accommodate the impactor propulsion system and to permit after - impact displacement of the vehicle impacted and installation of the test equipment.
 - 6.1.2 The part in which vehicle impact and displacement occur shall be horizontal, flat and smooth and have a coefficient of friction of not less than 0.5.
 - 6.2 Moving impact barrier
 - 6.2.1 The impactor shall be of steel and of rigid construction.
 - 6.2.2 The impacting surface shall be flat, not less than 2,500 mm wide, and 800 mm high.
 - 6.2.3 Its edges shall be rounded to a radius of curvature of between 40 and 50 mm.
 - 6.2.4 It shall be clad with a layer of plywood 20 mm thick.

- 6.2.5 The impactor shall be secured to the moving barrier.
- 6.2.5.1 When the impactor is secured to a carriage (moving barrier) by a restraining element, the latter must be rigid and be incapable of being deformed by the impact.
- 6.2.5.2 The carriage shall at the moment of impact be capable of moving freely and no longer be subject to the action of the propelling device.
- 6.2.5.3 The aggregate weight (mass) of carriage and impactor shall be $(1,100 \pm 20)$ kg.
- 6.3 Test vehicle
- 6.3.1 The vehicle under test shall either be fitted with all the normal components and equipment included in its unladen kerb weight or be in such condition as to fulfil this requirement so far as the components and equipment of concern to the passenger compartment and the distribution of the weight of the vehicle as a whole, in running order, are concerned.
- 6.3.2 The fuel tank shall be filled to at least 90% of its capacity with a liquid having a density close to that of the fuel normally used. All other systems (brake-fluid, header tanks, radiator, etc.) may be empty.
- 6.3.3 A gear shall be engaged and the brakes shall be applied.

7- TEST PROCEDURE (B)

- 7.1 The moving impact barrier shall be moved to impact the vehicle and the following shall be met:
 - 7.1.1 The impacting surface shall be vertical and perpendicular to the median longitudinal plane of the impacted vehicle.
 - 7.1.2 The direction of movement of the impactor shall be substantially horizontal and parallel to the median longitudinal plane of the impacted vehicle.
 - 7.1.3 The maximum lateral deviation tolerated between the median vertical line of the surface of the impactor and the median longitudinal plane of the impacted vehicle shall be 300 mm.
 - 7.1.4 The impacting surface shall extend over the entire width of the impacted vehicle.
 - 7.1.5 The ground clearance of the lower edge of the impacting surface shall be 175 ± 25 mm.
 - 7.1.6 The speed of the barrier at the moment of impact with the vehicle shall be between 35 and 38 km/h.
 - 7.1.7 At the moment of impact, the moving barrier shall be disconnected from any external propulsion and/or guidance system.

8 TEST CONDITIONS (C)

The following shall be met: Fuel Spillage Measurement for passenger cars, multipurpose passenger vehicles, trucks and buses having a GVW less than 4500 kg. The requirements of items 8 and 9 do not apply to vehicles meeting the requirements of items 4 and 5 or 6 and 7

- 8.1 Test site
 - 8.1.1 The test site shall be of sufficient area to provide for accommodation of the instruments, and for the attaining of the desired velocity by the moving deformable barrier.
 - 8.1.2 It shall have a horizontal section of hard standing, straight and at least 15 m long, which shall not slope from the horizontal by more than 3° over any one meter length of the path of the moving barrier.
 - 8.1.3 Provision shall be made so that the test car remains on the hard surface of track during the total time of test.
 - 8.1.4 It shall be equipped with means to move the impact barrier at the specified velocity, without deviation from its path, until impact.
- 8.2 Moving impact deformable barrier (Fig. 2)
 - 8.2.1 The total mass shall be (1367 ± 4.5) kg.
 - 8.2.2 The track width shall be (1870 ± 30) mm.
 - 8.2.3 The wheelbase shall be (2590 ± 10) mm.
 - 8.2.4 The centre of gravity shall be situated in the median longitudinal vertical plane within (7.6 ± 2.5) mm, (1120 ± 30) mm behind the front axle and (500 ± 25) mm above the ground.
 - 8.2.5 The deformable face of the barrier shall be mounted on the barrier.
 - 8.2.6 The distance between the front face of the impactor and the centre of gravity of the barrier shall be (2160 ± 30) mm.
 - 8.2.7 The ground clearance of the collision zone shall be (235 ± 5) mm measured in static condition before impact.
 - 8.2.8 The material of the impactor shall be an aluminum honeycomb or any other material can be used.
 - 8.2.9 The moving barrier shall be equipped with a suitable device to prevent a second impact on the struck vehicle.
- 8.3 Test Vehicle
 - 8.3.1 The passenger car shall be loaded with the weights corresponding to the kerb load plus rated cargo and luggage capacity weight, and the test dummies each standing in its located place.
 - 8.3.2 The Multipurpose passenger vehicle, truck, or bus shall be loaded with the weight corresponding to the kerb load, plus the test dummies, plus 136kg or its rated cargo and luggage capacity weight whichever is less .
 - 8.3.3 The fuel tank shall be filled to any level from 90 to 95% of its capacity with a liquid having a density close to that of the fuel normally used (Stoddard solvent).
 - 8.3.4 The fuel system other than fuel tank shall be filled with the same fuel mentioned in item 8.3.3 to its normal operating level.

8.3.5 The parking brake shall be disengaged and the transmission shall be in neutral.

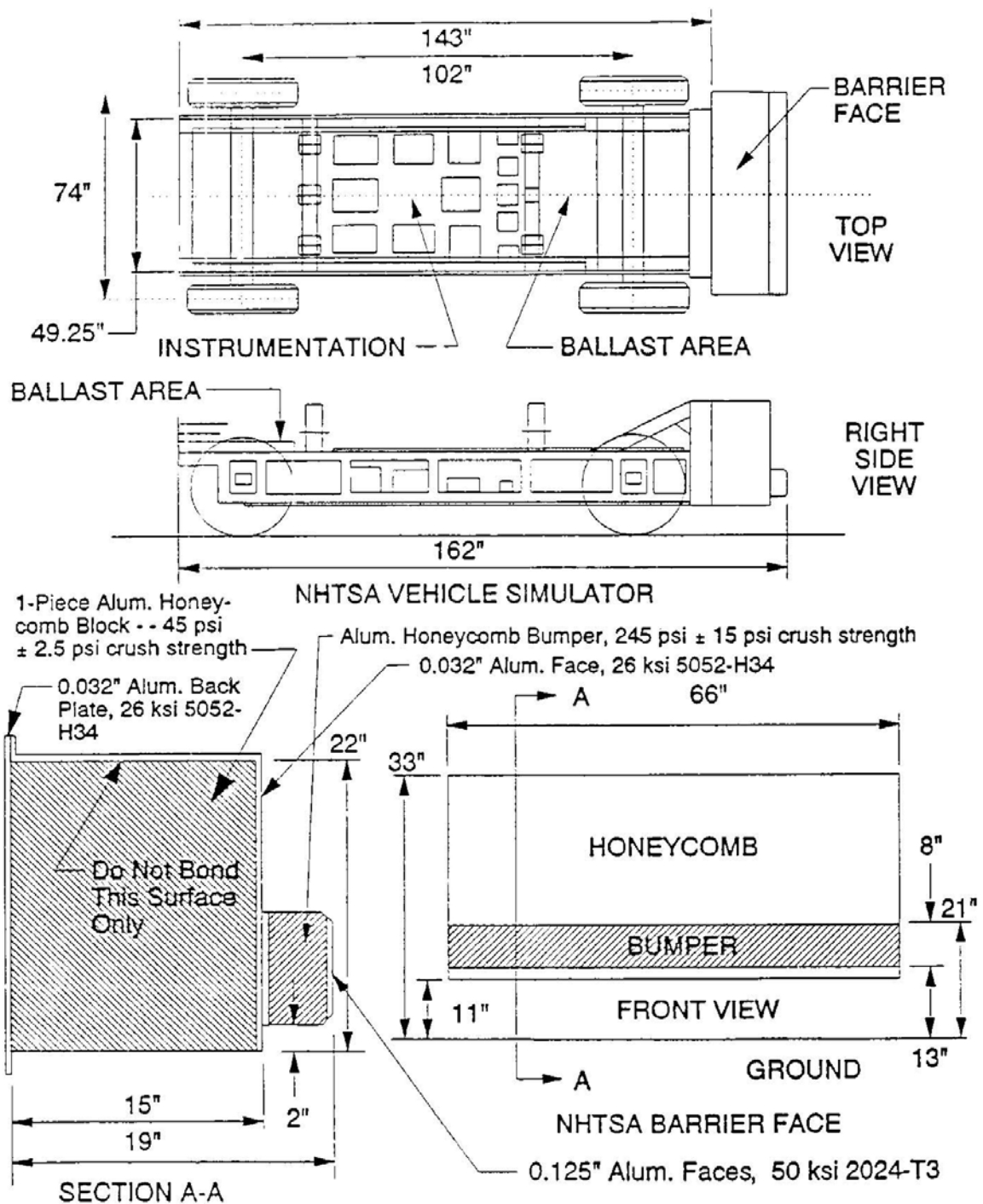
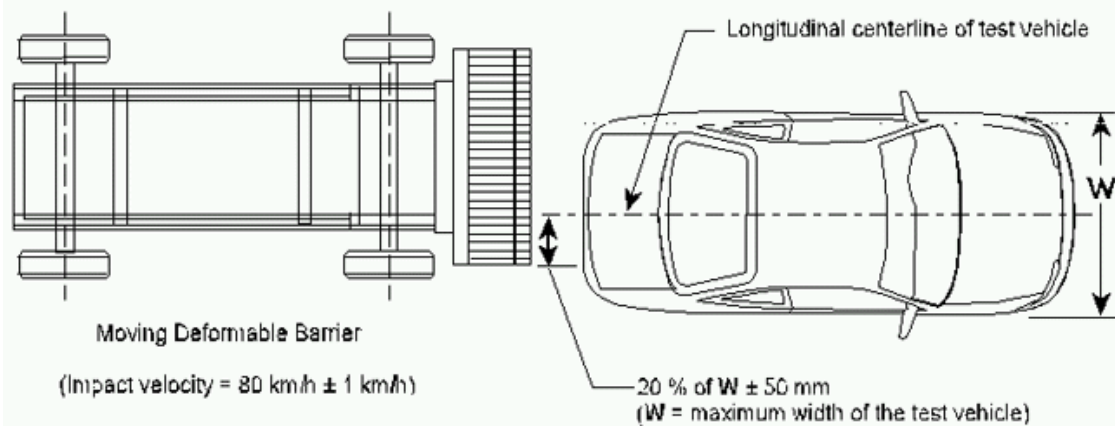


Fig. 2 Moving Impact Deformable Barrier

9.0 Test Procedure

- 9.1 The deformable barrier shall be moved to impact the vehicle and the following shall be met:
 - 9.1.1 The barrier impacts the test vehicle with the longitudinal centerline of the vehicle parallel to the line of travel and perpendicular to the barrier face within a tolerance of ± 5 degrees.
 - 9.1.2 The test vehicle and barrier face are aligned so that the barrier strikes the rear of the vehicle with 70 percent overlap toward either side of the vehicle. So aligned, the barrier face fully engages one half of the rear of the vehicle and partially engages the other half.
 - 9.1.3 At impact, the vehicle's longitudinal centerline is located inboard either of the side edges of the barrier by a distance equal to 20 percent of the vehicle's width ± 50 mm (see Figure 3).
 - 9.1.4 The vehicle's width shall be the maximum dimension measured across the widest part of the vehicle, including bumpers and molding, but excluding such components as exterior mirrors, flexible mud flaps, marker lamps, and dual rear wheel configurations.
 - 9.1.5 The speed of the barrier at the moment of impact with the vehicle shall be 80 ± 1.0 km/h.
 - 9.1.6 At the moment of impact, the moving barrier shall be disconnected from any external propulsion, and/or guidance system.
 - 9.1.7 The attachment of the moving barrier to any external propulsion or guidance system, shall not affect the characteristics of the moving barrier.
- 9.2 The liquid spillage from the fuel tank and fuel system, from the moment of impact to cessation of movement of the barrier and the vehicle, and during the five minutes period following their cessation, shall be measured. Also for the subsequent period of 25 minutes the fuel spillage shall be measured.

**FIGURE 3 – MOVING DEFORMABLE BARRIER
REAR IMPACT - 70 % OVERLAP**



10- RESULTS

10.1 Result (Procedure A)

10.1.1 The amount of fuel leaked out.

10.2 Result (Procedure B)

10.2.1 At the end of the impact test the longitudinal displacement of the vertical projection of the floor of the “R” point of the vehicle’s rearmost seat shall be determined and checked with the requirement.

10.2.2 Check any doors left opened after the test.

10.2.3 Check any rigid components that can cause injury.

10.2.4 The easy opening of the doors after the test without the use of tools.

10.3 Result (Procedure C)

10.3.1 The amount of fuel leaked out

11- TEST REPORT

The test report shall include the following information:

11.1 Test Report (A)

11.1.1 Description of test vehicle.

11.1.2 Load of test vehicle.

11.1.3 Load of barrier.

- 11.1.4 Barrier speed at the moment of impact.
- 11.1.5 Location of test devices.
- 11.1.6 Lateral misalignment of barrier.
- 11.1.7 Angle of impact.
- 11.1.8 Type of test carried out.
- 11.1.9 The amount of liquid spillage from the fuel tank and fuel system.
- 11.1.10 Date of test.
- 11.2 Test Report (B)
 - 11.2.1 Description of test vehicle.
 - 11.2.2 Load of test vehicle.
 - 11.2.3 Load of barrier.
 - 11.2.4 Barrier speed at the moment of impact.
 - 11.2.5 Location of test devices.
 - 11.2.6 Lateral misalignment of barrier.
 - 11.2.7 Angle of impact.
 - 11.2.8 Type of test carried out.
 - 11.2.9 The longitudinal displacement of the floor of the tested vehicle.
 - 11.2.10 The amount of liquid spillage from the fuel tank and fuel system.
 - 11.2.11 Date of test.
- 11.3 Test Report (C)
 - 11.3.1 Description of test vehicle and category of vehicle
 - 11.3.2 Load of test vehicle (GVW)
 - 11.3.3 Width of the vehicle
 - 11.3.4 Load of barrier.
 - 11.3.5 The distance between the front face of the barrier and its center of gravity
 - 11.3.6 Barrier speed at the moment of impact.
 - 11.3.7 Location of test devices.
 - 11.3.8 Lateral misalignment of barrier.
 - 11.3.9 Angle of impact.
 - 11.3.10 The percentage of overlap
 - 11.3.11 The amount of liquid spillage from the fuel tank and fuel system.
 - 11.3.12 Date of test.

